Claims

1. In a miniature component carrier having a thin, resilient mask through which multiple slots are formed, each of the multiple slots being of nominal size and shape to compliantly receive and hold a miniature component, a method of forming the slots in the resilient mask, comprising:

providing a support blank of thin elastomeric material that is flexible and operationally adequately absorbs light included within a light absorption wavelength range, the support blank including a composition of an elastomeric material and a light absorptivity enhancement material, the elastomeric material imparting elastic properties to the support blank to make it flexible and the light absorptivity enhancement material imparting light absorptivity properties to the support blank to make it operationally adequately absorb light included within the light absorption wavelength range but not to operationally change the elastic properties;

providing a laser beam of a wavelength that is included within the light absorption wavelength range;

directing the laser beam to the support blank; and

moving the laser beam and support blank relative to each other such that the laser beam is incident on the support blank to cut multiple slots with repeatable, precise dimensions and thereby form a slotted resilient mask, each of the slots cut to have opposed slot side margins shaped to grip between them a miniature component and hold it in a controlled orientation.

2. The method of claim 1, in which the light absorptivity enhancement material includes iron oxide or titanium dioxide.

3. The method of claim 2, in which the light absorption wavelength range includes wavelengths shorter than about 550 nm.

4. The method of claim 1, in which the light absorptivity enhancement material includes a dye or a pigment.

5. The method of claim 1, in which the elastomeric material includes silicone rubber.

6. The method of claim 5, in which the laser beam has a wavelength of about 355 nm.

7. The method of claim 1, in which each of the multiple slots has a slot length and opposite ends between which the opposed slot side margins extend, the opposed side margins being separated along their slot lengths by slot distances, the

slot distances including longer distances at the opposite ends and a shorter distance at a medial location between the opposite ends.

8. The method of claim 7, in which the slot distances at the opposite ends and the slot distance at the medial location for each slot are, respectively, maximum and minimum distances separating the opposed slot side margins along their slot lengths.

9. The method of claim 7, in which the slot lengths of each slot are substantially the same and the slot distances from the opposite ends to the medial location differ by amounts to form a generally centrally tapered slot.

10. The method of claim 9, in which the generally centrally tapered slot is of a dog bone or bow tie shape.

11. The method of claim 1, in which each of the multiple slots has a slot length and opposite ends between which the opposed side margins extend, the opposed side margins being separated along their slot lengths by alternating shorter and longer distances that form corresponding alternating narrower and wider openings.

12. The method of claim 11, in which the narrower openings are in the general form of concave tapered segments and the wider openings are in the general form of parallel straight line segments.

13. The method of claim 12, in which the opposed side margins at the opposite ends of each slot are separated by the longer distances.

14. The method of claim 1, in which the miniature component carrier is in the form of a carrier tape having a tape length, the carrier tape including a core portion having multiple apertures spaced apart along the tape length and covered by the support blank of thin elastomeric material to form the resilient mask, the slots cut in the resilient mask at locations where the elastomeric material covers the apertures.

15. The method of claim 14, in which the carrier tape has opposite tape side margins running along the tape length and includes multiple drive holes mutually spaced apart along the tape length on each of the tape side margins.

16. The method of claim 14, in which the core portion of the carrier tape includes flexible metal into which the multiple apertures are formed.

17. The method of claim 16, in which the flexible metal includes stainless steel and the elastomeric material includes silicone rubber.

18. The method of claim 1, in which the miniature component carrier is in the form of a carrier belt having a belt length, the carrier belt including multiple apertures each of which adapted to receive one of the support blanks of thin elastomeric material to form the resilient mask into which multiple slots are cut.

19. The method of claim 18, in which the multiple slots of each support blank of thin elastomeric material received by the carrier belt are aligned in a direction transverse to the belt length.

20. The method of claim 18, in which the carrier belt is of an endless type and includes flexible metal in which the multiple apertures are included.

21. The method of claim 20, in which the flexible metal includes stainless steel and the elastomeric material includes silicone rubber.